The Morbidly Adherent Placenta

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MUSC
MEDICAL UNIVERSITY
of SOUTH CAROLINA
Changing What's Possible
Nothing to Disclose

Objectives

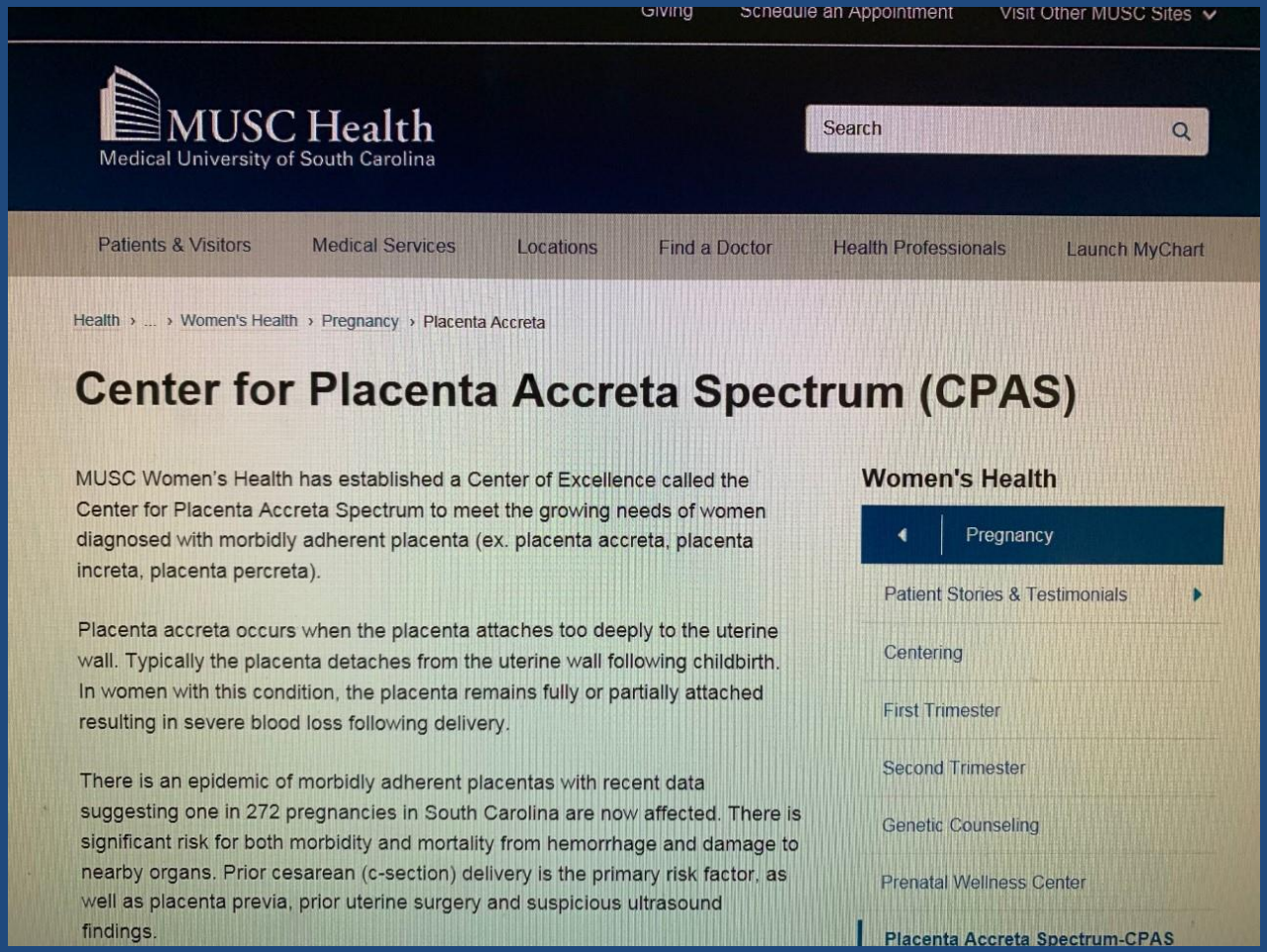
- Historical Perspective
- Epidemiology and pathophysiology
- Diagnosis and imaging modalities
- Delivery planning and management
- Adjuvant Therapies

Accreta: Organic or Man Made?

- A disease of the 20th century
- 1937 – case series of 20 patients by Irving and Hertig
  - "abnormal adherence, either in whole or in part, of the afterbirth to the underlying uterine wall"

- First cases occurred approx 2 decades after Pfannenstiel and Kerr papers updated cesarean technique

Modern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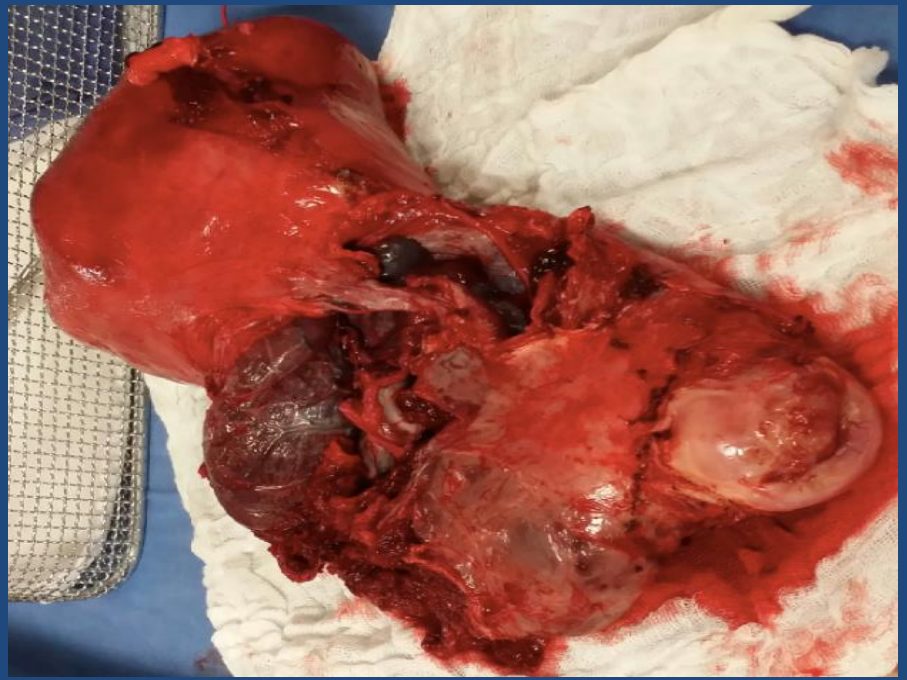
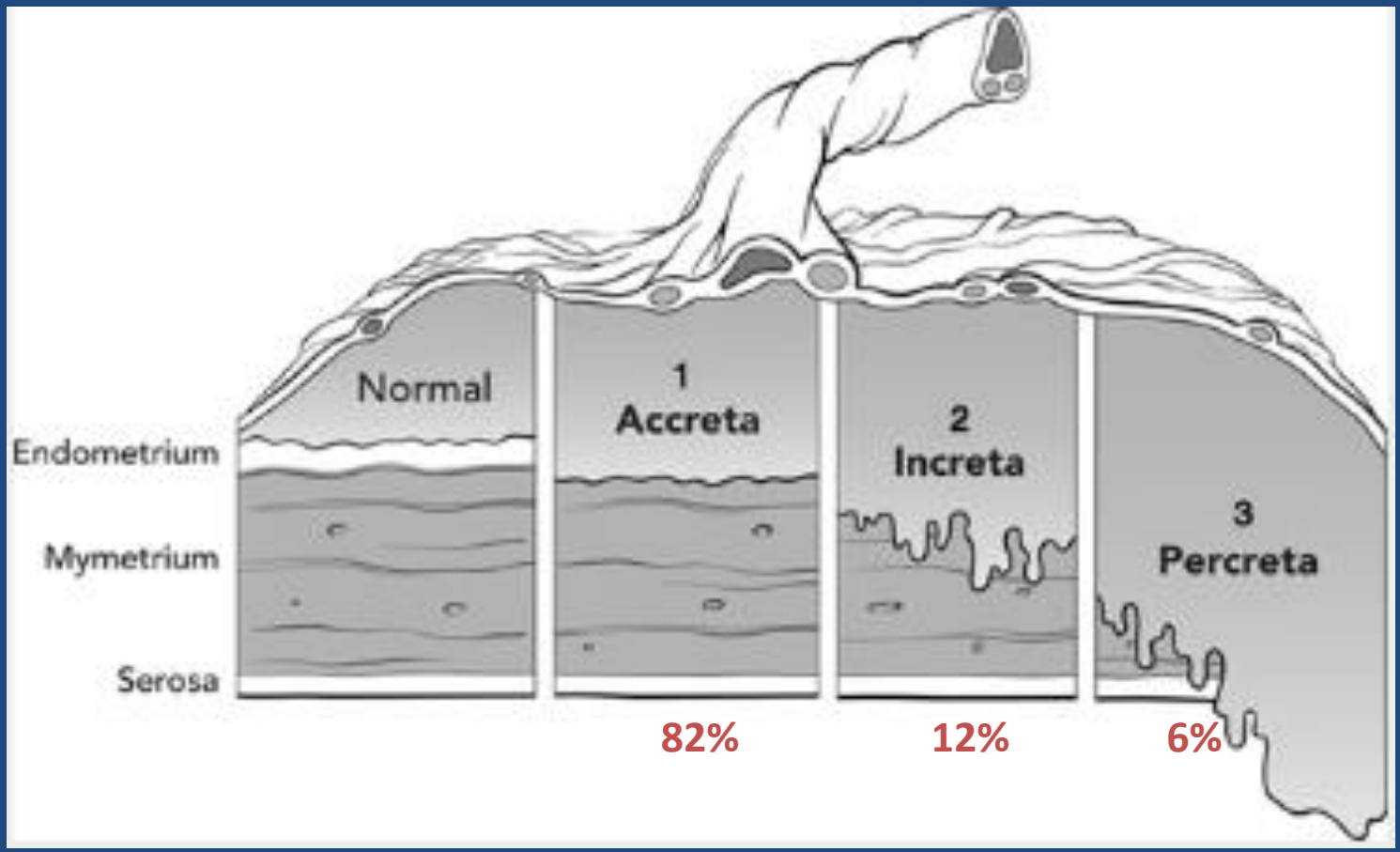
Health › ... › Women's Health › Pregnancy › Placenta Accreta
Center for Placenta Accreta Spectrum (CPAS)
MUSC Women's Health has established a Center of Excellence called the Center for Placenta Accreta Spectrum to meet the growing needs of women diagnosed with morbidly adherent placenta (ex. placenta accreta, placenta increta, placenta percreta).
Placenta accreta occurs when the placenta attaches too deeply to the uterine wall. Typically the placenta detaches from the uterine wall following childbirth. In women with this condition, the placenta remains fully or partially attached resulting in severe blood loss following delivery.
There is an epidemic of morbidly adherent placentas with recent data suggesting one in 272 pregnancies in South Carolina are now affected. There is significant risk for both morbidity and mortality from hemorrhage and damage to nearby organs. Prior cesarean (c-section) delivery is the primary risk factor, as well as placenta previa, prior uterine surgery and suspicious ultrasound findings.
Women's Health
Pregnancy
Patient Stories & Testimonials
Centering
First Trimester
Second Trimester
Genetic Counseling
Prenatal Wellness Center
Placenta Accreta Spectrum-CPAS

Morbidly Adherent Placentation

- Abnormal attachment of the placental villi directly to the myometrium due to an absence of decidua basalis and an incomplete development of the fibrinoid layer



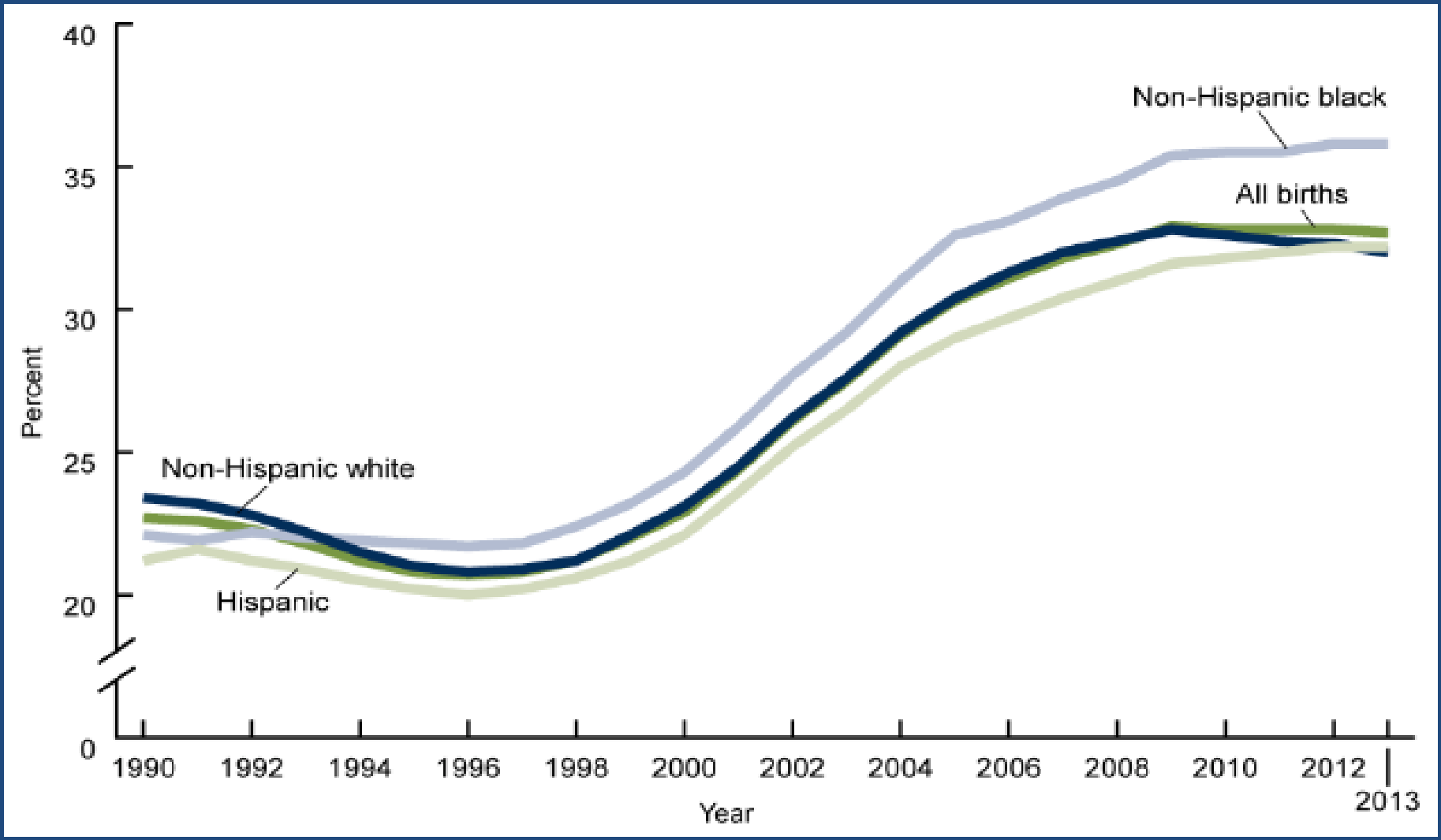
Types


Normal
1
Accreta
2
Increta
3
Percreta
Endometrium
Mymetrium
Serosa
82%
12%
6%

Epidemiology

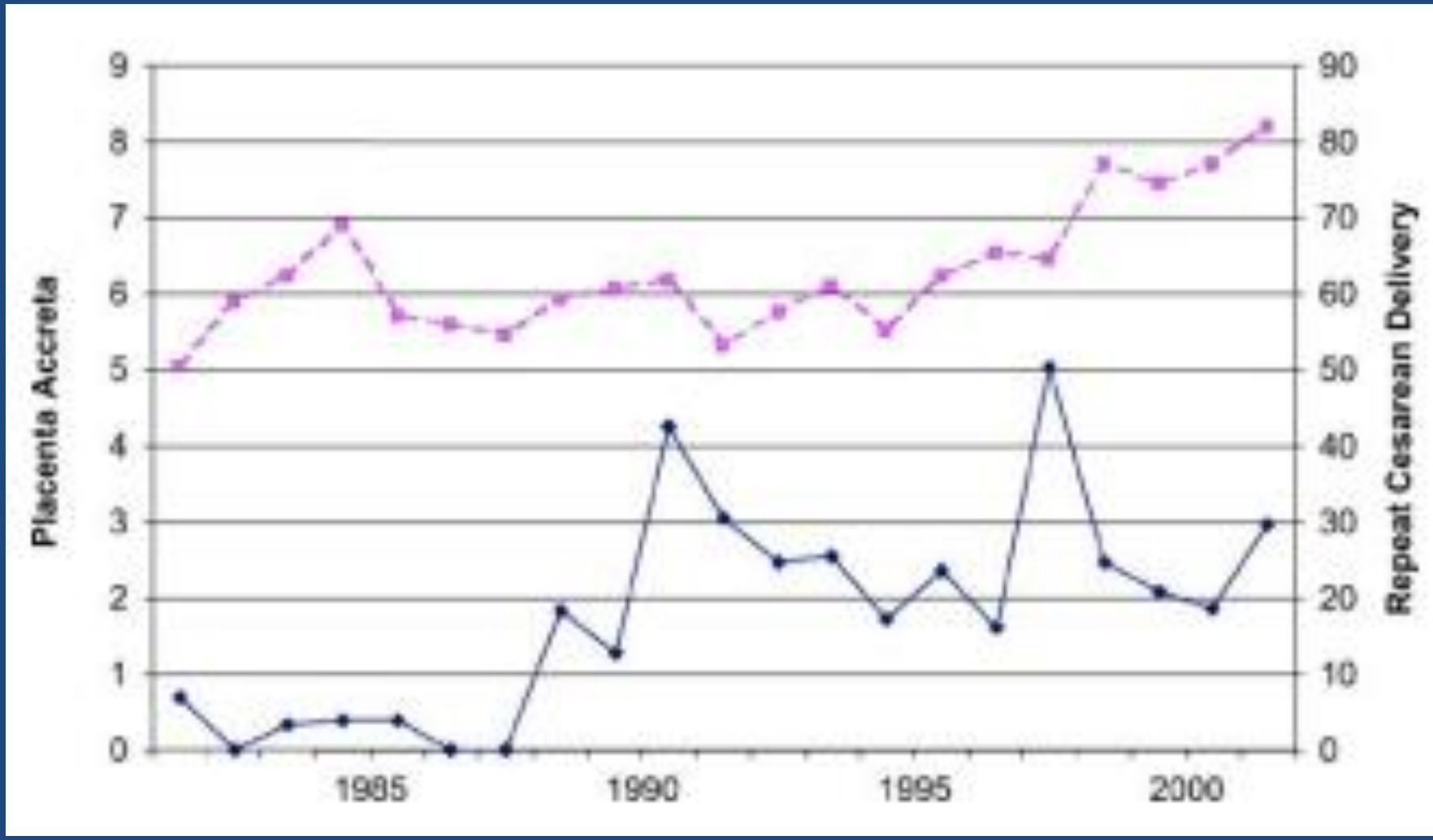
- Incidence 1:533
- Largest risk factors =
  - **Previa + Previous cesarean section**
  - Increasing parity
  - Increased maternal age
  - Other prior uterine surgery
  - IVF
  - UAE, endometrial ablation
  - Chemotherapy/prior pelvic radiation
  - Adenomyosis/fibroids

Cesarean Delivery on the rise…



CDC/NCHS, Nat Vital Stats Sys, vol 63, Jan 2014.

Accreta outpacing cesarean



Wu et al, Am J Obstet Gynecol, 2005

How does previous CD affect risk?

No. of Prior Cesarean Delivery	Accreta Risk (%) No previa	Accreta Risk (%) Previa
1	0.03	3.3
2	0.2	11
3	0.1	40
4	0.8	61
5	0.8	67
6+	4.7	67

Silver, et al. Obstet Gynecol. 2006

Scope of the Problem

- Projections that cesarean rate will continue to climb
  - By 2020, US rate may approach 56.2%
  - Annual increase:
    - 6,236 placenta previas
    - 4,504 placenta accreta
    - 130 maternal deaths

Solheim, KN, et al. J Matern Fetal Neonatal Med, 2011

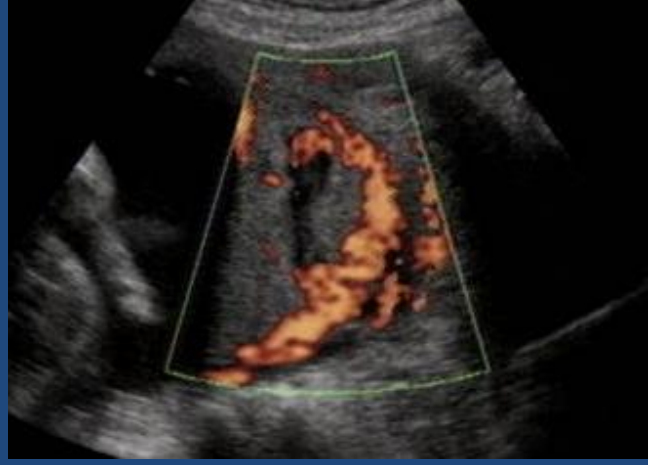
Diagnosis

- Antepartum Diagnosis is of **paramount** importance!
  - Multiple studies demonstrate improved maternal outcomes with antepartum vs. intra-partum dx
    - Decreased hemorrhage
    - Overall decreased maternal morbidity
  - Exclusion of diagnosis equally important
    - Prevent iatrogenic prematurity
    - Reduce invasive maternal procedures
    - Appropriate allocation of resources

Modalities for diagnosis

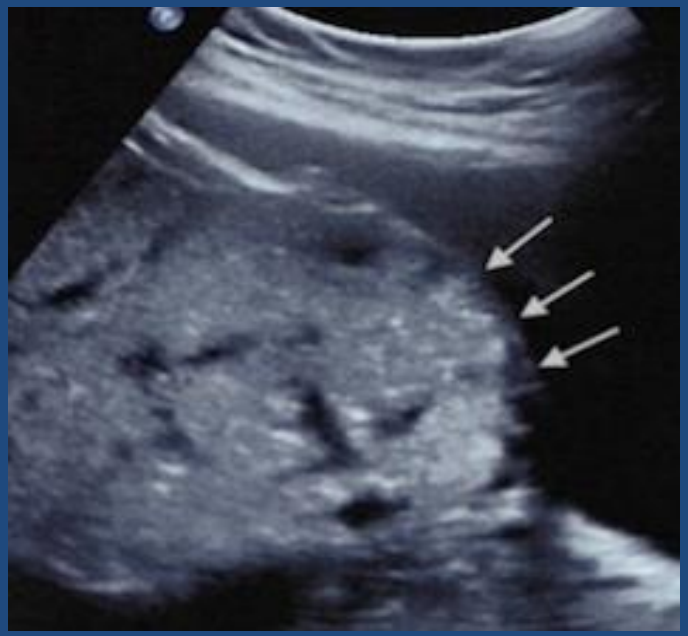
- Ultrasound
  - Gestalt
  - Standardized scoring
- MRI
  - More limited resource
  - Accurate interpretation requires experience

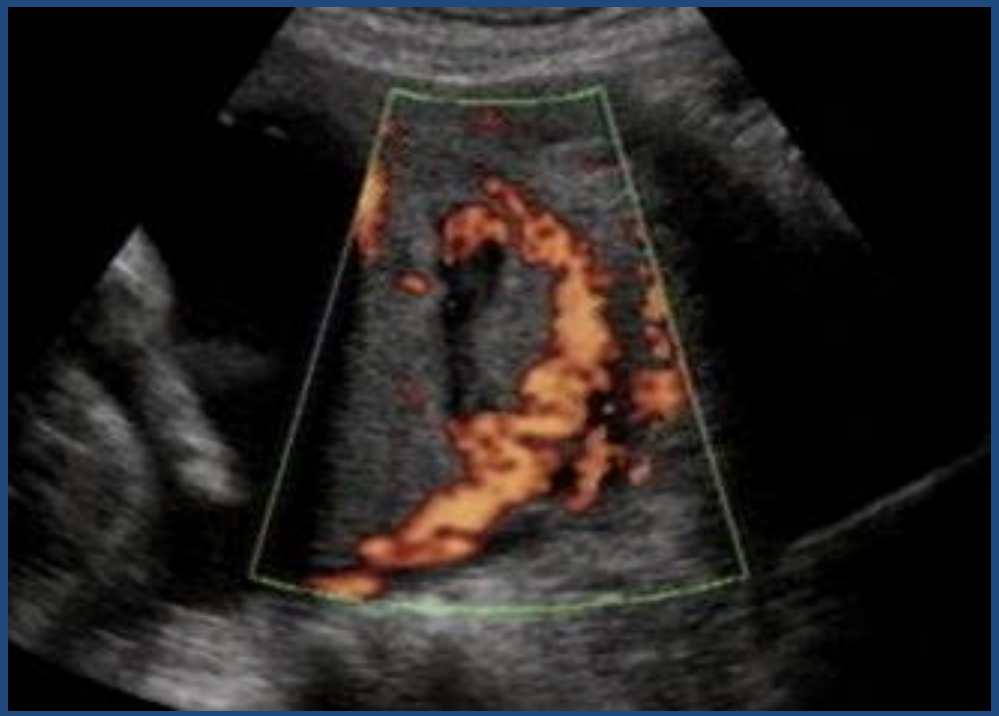
Ultrasound



- Gold standard for diagnosis
- Sensitivity 77-90%, Specificity 71-97%
  - Depends on placenta location
- In general evaluate:
  - Loss of hypo-echoic retro-placental myometrial zone
  - Thinning, disruption of serosa-bladder interface
  - Increased vascularity at uterine-bladder interface
  - Increased intra-placental vascular lacunae

Ultrasound





Ultrasound predictors of placental invasion: the Placenta Accreta Index

- Retrospective review of 184 gravidas with >1 prior cesarean + previa or low lying placenta
  - Published in 2015
  - Investigators reviewed US images blinded to pregnancy outcome
  - Placental Accreta Index developed with logistic regression
  - 54 (29%) had invasion confirmed on pathologic assessment

Rac, M, et al. Am J Obstet Gynecol, 2015

PAI Index Calculation

- Value of each parameter is added together to generate the overall PAI score

Parameter	Score
> 2 cesarean deliveries	3.0
Lacunae	
Grade 3	3.5
Grade 2	1.0
Sag Smallest Myometrial Thickness	
<1mm	1.0
<1 but >3mm	0.5
>3 but <5mm	0.25
Anterior placenta previa	1.0
Bridging vessels	0.5

Ultrasound predictors of placental invasion: the Placenta Accreta Index

PAI	Probability of invasion	Sensitivity	Specificity	PPV	NPV
>0	5%	100%	19%	38%	100%
>1	10%	97%	47%	47%	97%
>2	19%	93%	58%	52%	94%
>3	33%	86%	68%	57%	91%
>4	51%	72%	85%	70%	86%
>5	69%	52%	92%	75%	79%
>6	83%	31%	100%	100%	75%
>7	91%	24%	100%	100%	73%
>8	96%	17%	100%	100%	71%

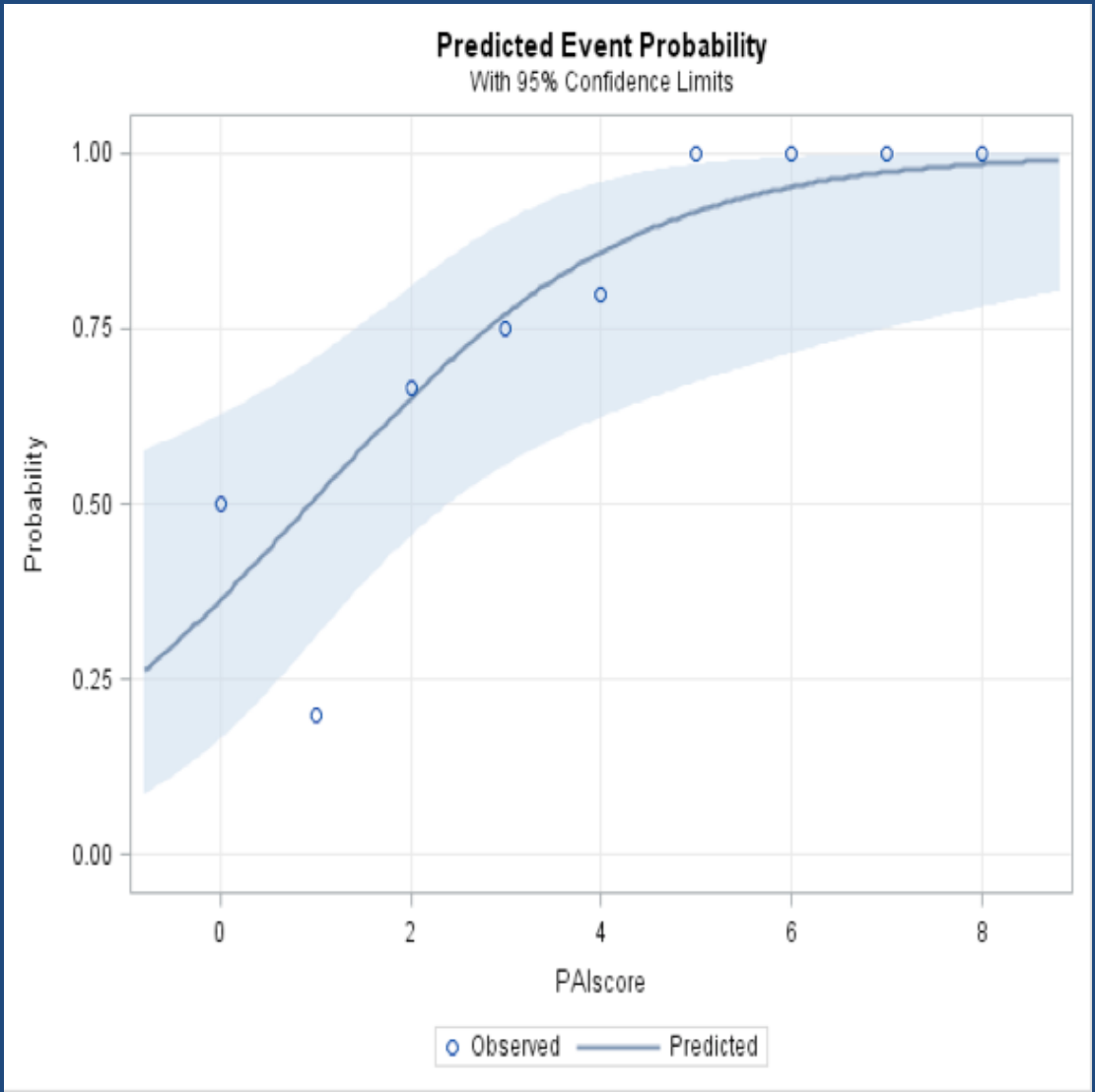
Rac, M, et al. Am J Obstet Gynecol, 2015

Validation of the PAI

- Retrospective blinded review of MUSC patients with previa/accreta
- 2005-15 – identified 66 cases
- 3 independent MFM reviews for PAI score

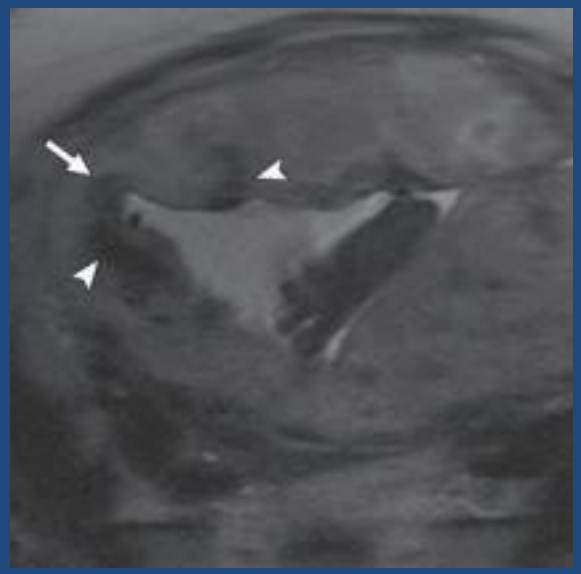
- Pre PAI implementation – 66% accurate
- Post PAI implementation – 80.3% accurate

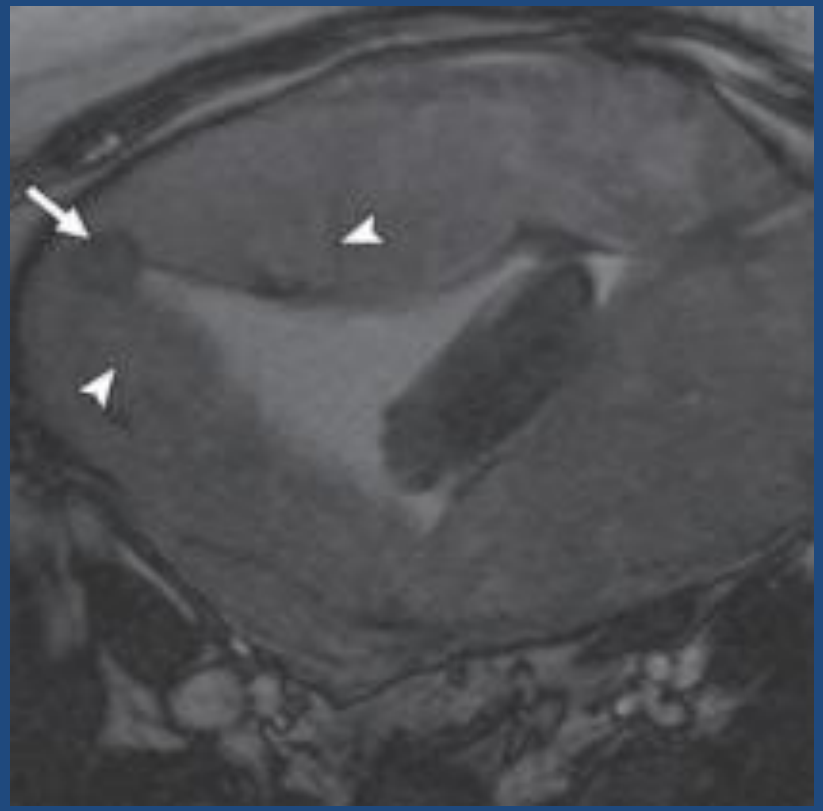
Validation of the PAI



MRI

- 11 studies evaluating MRI evaluation of invasive placentation
- Sensitivity :78-93%
- Specificity: 77-100%



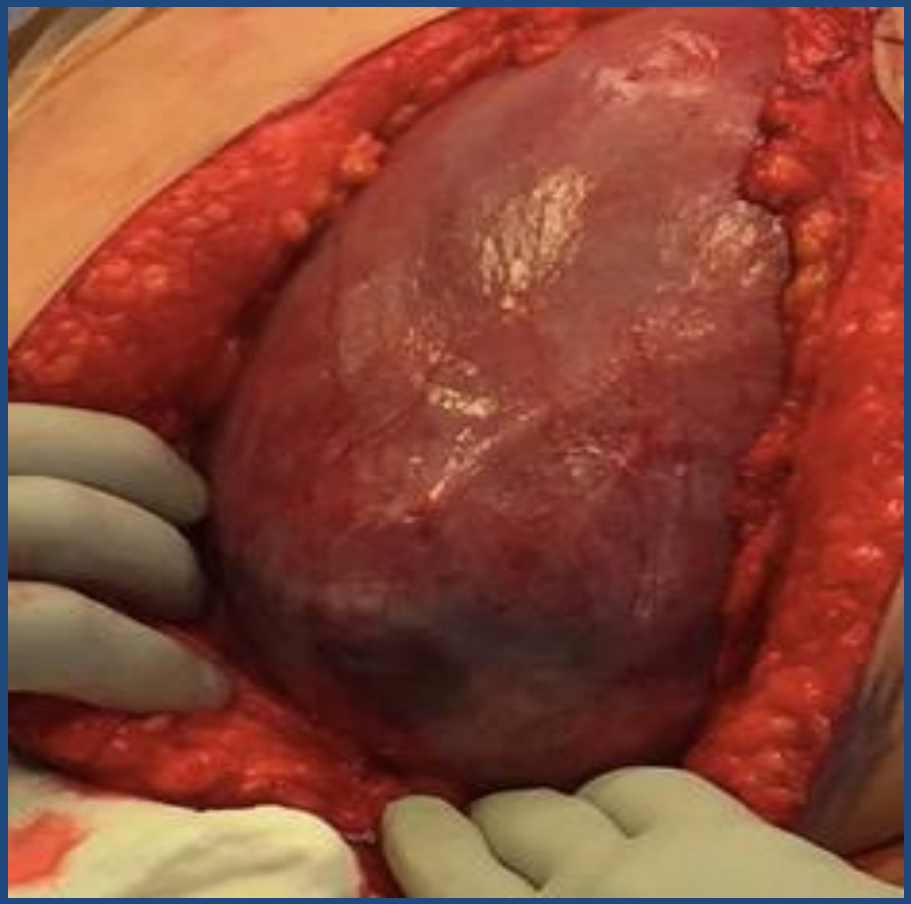


MRI

- Utilize selectively, not universally
  - Improved evaluation of posterior placentation

- Drawbacks:
  - Requires radiologist expertise in placental imaging
  - Later GA (28-32 weeks)
  - Maternal discomfort
  - Cost

Clinical Management



Management Goals

1. ANTEPARTUM DIAGNOSIS

1. Balance risks of prematurity while avoiding need for emergency delivery due to labor or bleeding

Maternal Morbidity in Cases of Placenta Accreta Managed by a Multidisciplinary Care Team Compared With Standard Obstetric Care

- Review of all accreta cases in Utah 1996-08
- Compared cases managed:
  - 1. multi-disciplinary care team at 2 tertiary hospitals
  - 2. similar cases managed at 26 other hospitals

Eller, AG, Obstet Gynecol, 2011

	Multidisciplinary Care Center (n=60)	Standard Care Center (n=23)	P
Estimated blood loss (L)	2.6 (0.15–9)	4.0 (0.6–23)	.096*
Maternal admission to intensive care unit	18 (30)	9 (39)	.427
Early reoperation	2 (3)	9 (41)	<.001†
Coagulopathy‡	17 (28)	9 (41)	.278
Large-volume blood transfusion			
4 or more units of packed red cells	25 (42)	16 (70)	.023
Cystotomy	22 (37)	10 (43)	.568
Ureteral injury	4 (7)	4 (17)	.208†
Infectious complications	18 (30)	5 (23)	.590†
Wound infection	8 (13)	4 (18)	
Intraabdominal infection	4 (7)	0	
Vaginal cuff cellulitis	2 (3)	0	
Pyelonephritis	4 (7)	1 (5)	
Pneumonia	0	0	
Postoperative length of stay (d)	4 (3–13)	5 (2–26)	.280
4 or fewer	31 (52)	11 (48)	
5–8	24 (40)	6 (26)	
9 or more	5 (8)	6 (26)	
Hospital readmission within 6 wk	7 (12)	3 (13)	1.000†
Delayed reoperation§	5 (8)	3 (13)	.679†
Early composite morbidity‖	28 (47)	17 (74)	.026
Late composite morbidity¶	12 (20)	5 (22)	1.000†

Early morbidity = ICU admit >24 hrs, transfusion >4uPRBC, coagulopathy, ureteral injury, reoperation within 24 hrs

Eller, AG, Obstet Gynecol, 2011

Accreta Center of Excellence

Suggested criteria for accreta center of excellence

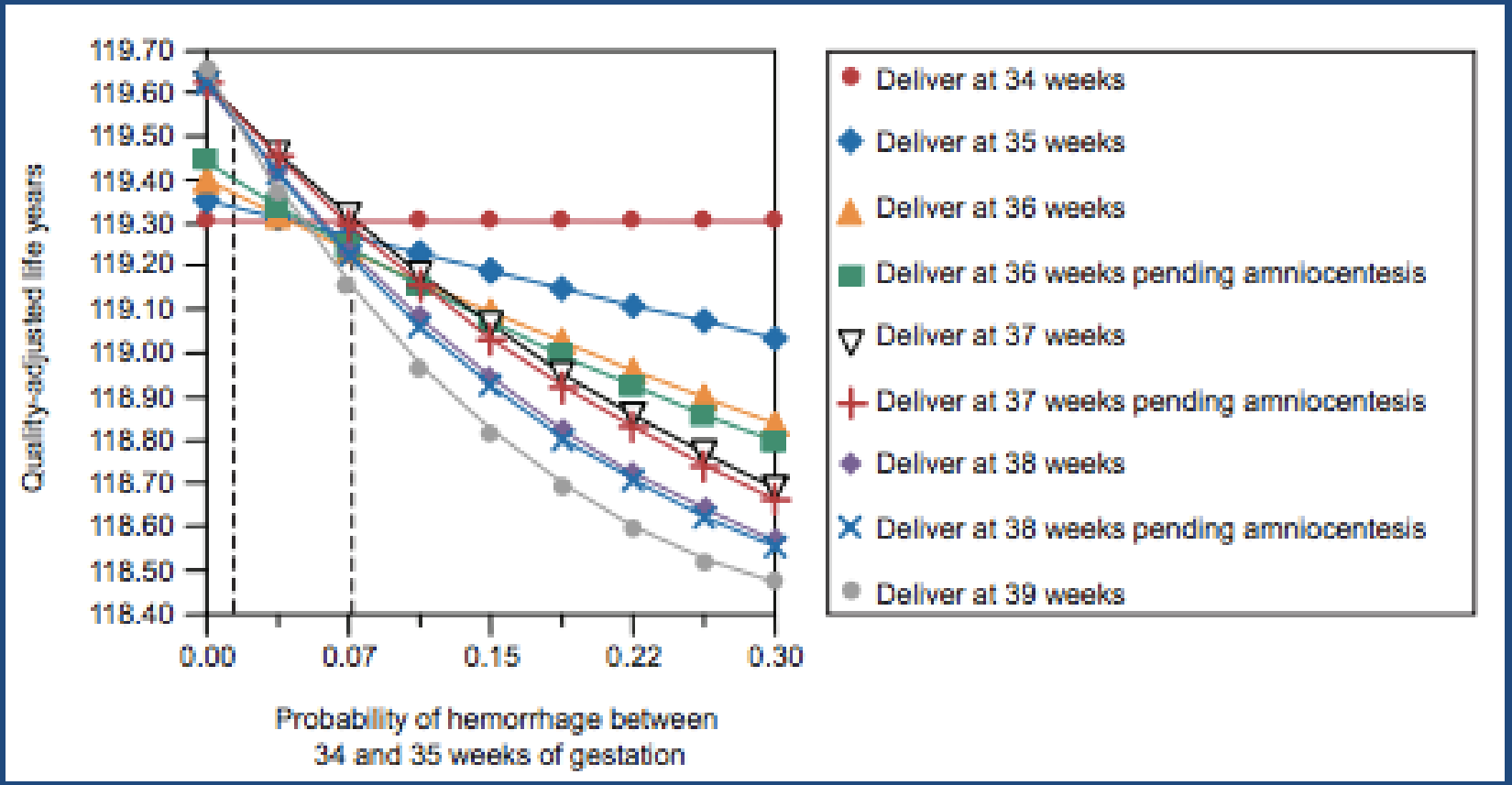
1. Multidisciplinary team
   a. Experienced maternal-fetal medicine physician or obstetrician
   b. Imaging experts (ultrasound)
   c. Pelvic surgeon (ie, gynecologic oncology or urogynecology)
   d. Anesthesiologist (ie, obstetric or cardiac anesthesia)
   e. Urologist
   f. Trauma or general surgeon
   g. Interventional radiologist
   h. Neonatologist

2. Intensive care unit and facilities
   a. Interventional radiology
   b. Surgical or medical intensive care unit
      i. 24-h availability of intensive care specialists
   c. Neonatal intensive care unit
      i. Gestational age appropriate for neonate

3. Blood services
   a. Massive transfusion capabilities
   b. Cell saver and perfusionists
   c. Experience and access to alternative blood products
   d. Guidance of transfusion medicine specialists or blood bank pathologists

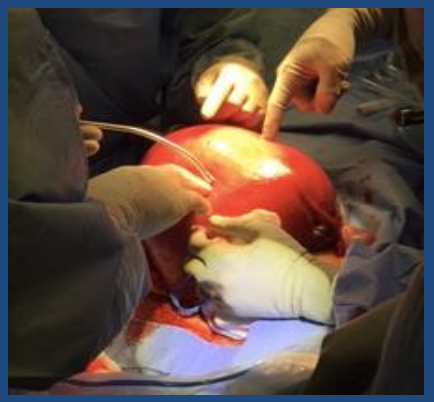
Silver, RM, et al. Am J Obstet Gynecol, 2015

Timing of Delivery



Robinson, BK and Grobman WA, Obstet Gynecol, 2010

Peri-Operative Considerations



- OB or cardiac anesthesia
  - Preoperative consultation
- Neonatology
- Consideration of betamethasone course
- Large bore IV access / central line
- Availability of significant blood products
- General anesthesia
- Skin Incision
- Hysterotomy
- ICU available for recovery

Leave the placenta ALONE!

- Manual removal of the placenta
  - Increases maternal morbidity 67% vs 36% (p=0.04)
    - ICU admission for >24hrs
    - Massive Transfusion (>4uPRBC)
    - Coagulopathy
    - Ureteral Injury
    - Early re-operative

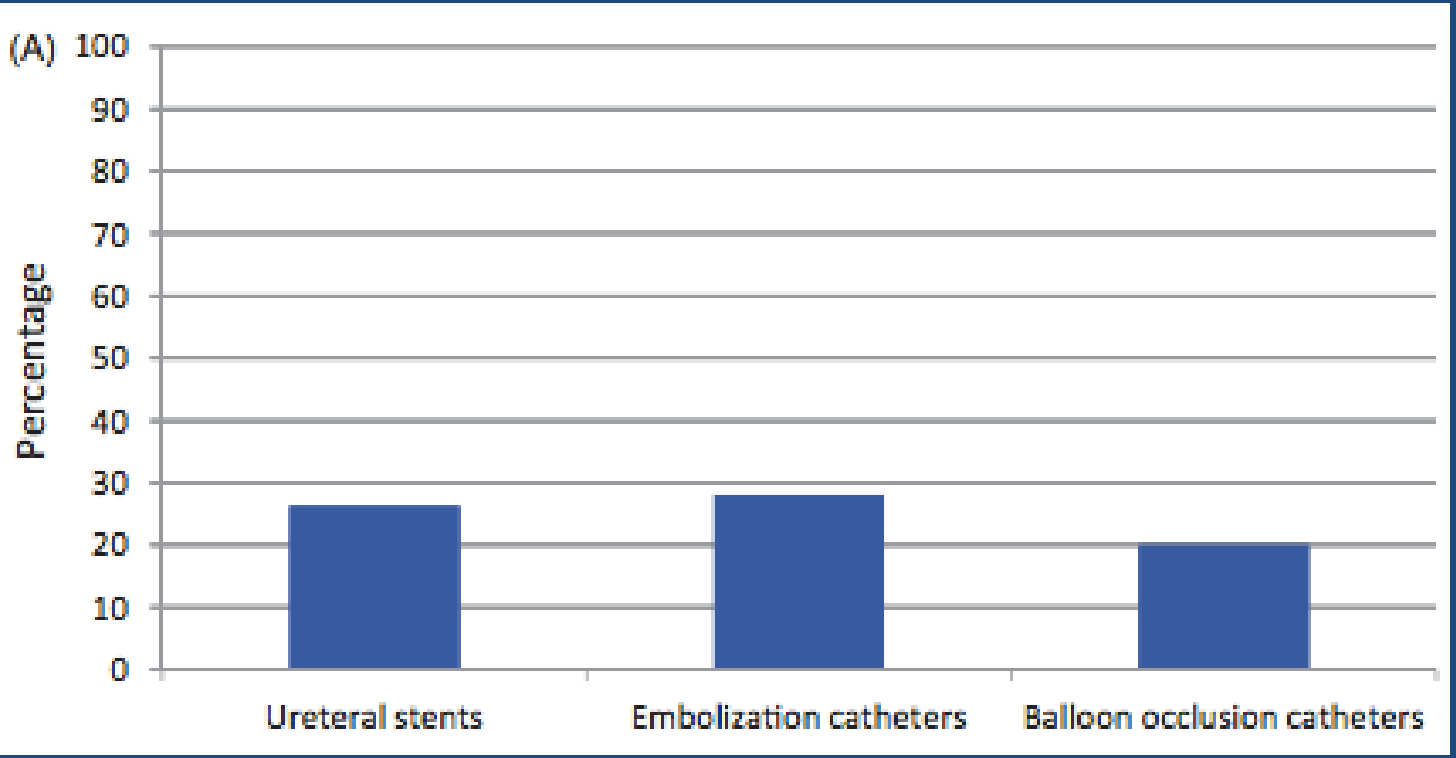
Eller, AG, et al. BJOG, 2009

Intra-operative Diagnosis

- **Delay** uterine incision if things look abnormal
  - Distorted/ballooned LUS
  - Blood vessels on uterine serosa
  - Bladder or surrounding tissue invasion
- Evaluate for active bleeding
- Determine availability of resources
  - Blood, surgical assistance, equipment
  - If patient stable, facility unprepared – consider fascial closure, transfer to tertiary care center

Adjuvant Therapies

Adjuvant Procedures



Wright, JD, et al. J Matern Fetal Neonatal Med, 2013

Ureteral Stenting

- Risk of overall ureteral injury 29%
- Antenatal Dx decreases risk 39% vs 63% (p=0.04)
- Preoperative stent placement:
  - Decreased risk of injury (6% vs 33%) (p=0.01)

Tam Tam, et al. J Matern Fetal Neonatal Med 2012

Vessel Occlusion

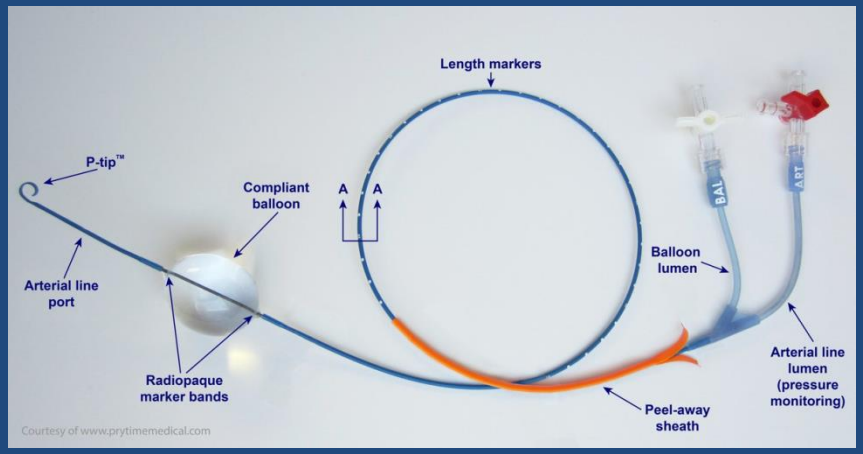
- Goal = decreased uterine perfusion
- Accomplished with balloon occlusion or embolization of uterine or internal iliac artery
- Controversial –
  - Critics site collateral uterine blood flow and risk of complications
    - Arterial rupture
    - Pseudo-aneurysm formation

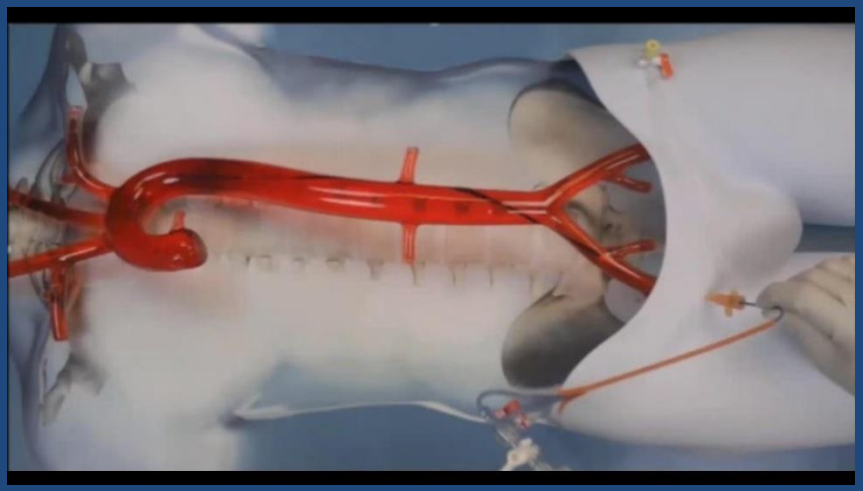
Vessel Occlusion

- Small case-control study (n=117)
  - 59 pts managed with intraoperative uterine atery balloons (UAB)
  - UABs
    - Lower mean EBL (2165mL vs 2837mL, p=0.02)
    - More EBL>2500mL and massive transfusions (>6uPRBC) in non UAB group
    - 3% complication rate related to UAB
    - No difference in surgical time

Ballas, J. Am J Obstet Gynecol, 2012

REBOA


Length markers
P-tip™
Compliant balloon
A
A
Arterial line port
Radiopaque marker bands
Balloon lumen
BAL
ART
Arterial line lumen (pressure monitoring)
Peel-away sheath
Courtesy of www.prytimemedical.com



Conservative Management

- Appropriate for focal/limited disease
  - Curettage, wedge resection
- Desired future fertility?
  - At least a 20% recurrence risk
- Extreme percreta, unresectable disease

Considerations for uterine conservation

- No clear consensus or “best practice”
  - Often considered:
    - Utero-tonics
    - Prophylactic uterine artery embolization
    - Antibiotic therapy
    - Methotrexate administration*
    - Inpatient vs outpatient
    - Serial lab assessment
    - Interval to hysterectomy

Maternal Outcome After Conservative Treatment of Placenta Accreta

- Retrospective multi-center French Trial
- 167 conservatively managed accreta
- 25% with more than 1 prior cd
- 55% had no prior imaging
- Successful in 78%
- Placenta absorption in 75%, avg 13.5 weeks

Characteristic	Placenta Accreta, Including Percreta (n=167)
Hysterotomy (n=139)	
Fundal	71 (51.1)
Low transverse	68 (48.9)
Placenta left in situ	167 (100)
Partially	99 (59.3)
Entirely	68 (40.7)
Preoperative ureteric stent placement	6 (3.6)
Uterotonic administration	167 (100)
Primary postpartum hemorrhage	86 (51.5)
No additional uterine devascularization procedure	58 (34.7)
Additional uterine devascularization procedure	109 (65.3)
Pelvic arterial embolization*	62 (37.1)
Vessel ligation*	45 (26.9)
Stepwise uterine devascularization	15 (9.0)
Hypogastric artery ligation	23 (13.8)
Stepwise uterine devascularization and hypogastric artery ligation	7 (4.2)
Uterine compression suture*	16 (9.6)
Balloon catheter occlusion	0
Methotrexate administration	21 (12.6)

Sentilhes, L. Obstet Gynecol, 2010.

Maternal Morbidity with Conservative Management

- Sentilhes et al: n=167
  - 51% PPH
    - 40% transfusion, 15% >5uPRBC
  - 44% with secondary PPH
  - 65% required additional procedures
  - 28% infection, 4% sepsis
  - 2% DVT/PE
  - 1 maternal death (assoc with MTX use)
- Pather review: n=57
  - 60% delayed hysterectomy, 40% emergent
- Clausen et al: n=119
  - 58% delayed hysterectomy, 85% emergent

A word about Methotrexate

- Considered in therapy to increase rate of placental absorption
  - First described in 1986
- Contra-indicated in breast feeding
- Additional risks of pancytopenia, nephrotoxicity
- Mixed results in literature
- Largest cohort of conservative mgmt (Sentilhes)…
  - “no convincing evidence currently supports the efficacy of methotrexate in cases of placenta accreta”


NEVER GO CAMPING
WITH A C-SECTION BABY
BRAD ALSTON 2014

Grading Systems

- Questionable clinical utility in the antepartum period
- Improving imaging technology makes more relevant
- Refer to grades of histological invasion by trophoblastic cells into the myometrium

Abnormal Placentation

- Risk factors well established…

  ...but underlying mechanisms poorly understood
- Pathologic adherence likely involves:
  - Myometrial degenerative changes
    - Increased fibrous tissue deposits
    - Inflammatory cell infiltration
  - Abnormal cell signaling
    - VEG-F, EGF, sFlt-1
- All predisposes to
  - Total or partial loss of decidua
  - Increased depth of myometrial invasion

Jauniaux, E. and Jurkovic D. Placenta, 2011

Thank you!